



# Spaceport News

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John F. Kennedy Space Center

## Space Station vision inspires

The "International Space Station Vision" was presented to a standing-room-only audience in the Training Auditorium at Kennedy Space Center on March 7.

KSC employees working on the International Space Station (ISS) were applauded for their successful efforts and encouraged to recognize the overall vision in which they play a vital role.

"In order to make progress we've got to have a vision," said KSC Director Roy Bridges.

The vision for the International Space Station is that of "a human outpost in space bringing nations together for the benefit of life on Earth ... and beyond," he said.

Although the "ISS Vision" recognized the global efforts involved with the Space Station, including 16 international partners, the presentation focused on celebrating the local team effort between The Boeing Co. and NASA at KSC.

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### ISS Vision facts

The International Space Station when finished will

- include 1 million pounds of hardware on orbit, with two-thirds of the hardware belonging to the United States,
- be 356 feet wide and 290 feet long,
- generate enough power to power 50 homes,
- include six international laboratories,
- provide 43,000 cubic feet of pressurized volume for people to live in, about the equivalent of two 747s,
- be equipped with computers using 2 million lines of software code,
- house 122 standard racks for experiments and other Station necessities.



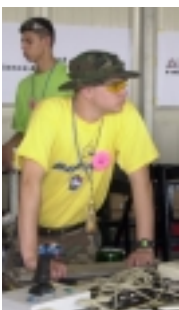
Discovery competed with the rising sun as it blasted off from Launch Pad 39B at dawn March 8 on mission STS-102. Liftoff was at 6:42 a.m. for this eighth flight to the International Space Station. Discovery carried into orbit the Leonardo module and the Expedition 2 crew.

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## KSC team wins top award

A team of Kennedy Space Center scientists and engineers won the NASA Commercial Invention of the Year Award for a process that converts hazardous waste from a propellant oxidizer to fertilizer, the NASA General Counsel recently announced.

It's the first time that KSC has won the award given annually by NASA Headquarters to recognize a significant technology spinoff developed at one of the NASA centers.

"We have a number of talented scientists and engineers on our team and we're proud of them. I believe this is just the first of many such awards for the Kennedy

Space Center," said KSC Director Roy Bridges.

The invention was developed by Dr. Clyde Parrish, NASA; Dr. Dale Lueck, NASA; Andrew Kelly, NASA; and Paul Gamble, Dynacs Engineering. Dynacs is the Engineering Development Contractor for KSC.

The inventors will be honored at

a ceremony at NASA Headquarters this spring where they will receive a check and a certificate from NASA Administrator Dan Goldin. The technology will be submitted as NASA's nominee for the Intellectual Property Owners Inc. Invention of the Year award, which is

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# Recognizing Our People

## AWARD ...

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held in cooperation with the United States Patent and Trademark Office.

The new scrubber process was developed in response to a NASA request to reduce the hazardous waste stream that is captured in a scrubber when the toxic oxidizer is transferred from storage tanks into the Space Shuttle's Orbital Maneuvering Subsystem (OMS) and Reaction Control System (RCS) pods and vice versa at the pad. The Shuttle's OMS is used for the major orbital and deorbit maneuvers and the RCS is used for orbiter attitude control.

The process was tested and is being implemented at KSC. The fertilizer generated is being used on KSC orange groves.

"This was very much a team effort," said Gamble, the current Dynacs technical lead for the project. "We're all very proud to have been a part of it. When we're able to commercialize a technology we've developed at KSC, it benefits everyone. It's another example of how the space program makes all



The award-winning invention was developed by, from left, Dr. Clyde Parrish, senior chemist, NASA; Paul Gamble, chemist, Dynacs Engineering; Dr. Dale Lueck, senior chemist, NASA; Andrew Kelly, hypergolic systems engineer, NASA.

our lives better."

Parrish suggested the original idea for the technology and led the development of the process, which started while he worked at Dynacs.

Parrish had worked on a Navy project team 25 years before that found an oxidizer used in battlefield illumination flares could be used as a fertilizer. Parrish has numerous patents and awards to his credit.

"When we were approached with the technical challenge to reduce

hazardous waste, I remembered the flare oxidizer project. I thought the scrubber chemistry could be modified to produce a fertilizer," Parrish said.

The invention has been licensed to Phoenix Systems International Inc. of McDonald, Ohio, an engineering firm that develops technologies applied to utility and industrial fossil fuel. The U.S. Air Force also has expressed interest in the technology for launch facilities

at Cape Canaveral Air Force Station, Fla., and Vandenberg Air Force Base, Calif.

The award represents another success for KSC's Technology Programs and Commercialization Office. The office works with KSC scientists and engineers to report new technologies and commercialize them when possible.

KSC was the top NASA center for licenses and Space Act Awards during the past fiscal year. And in addition to many other awards presented to KSC teams during the past year, a KSC team won the Technology Hall of Fame Award for the first time in 10 years.

"Our office has been striving to create an awareness of all facets of new technology reporting, including the awards program. As a part of this effort, we're seeking to provide more recognition for our inventors and their inventions," said Pam Bookman, a commercialization manager for the office. "Our people have always produced new technologies to cope with the operational challenges we face, but they're realizing more often now that those technologies can often be commercialized."



## March employees of the month

NASA Employees of the month for March are, from left to right, front row, Cathryn Hope of Spaceport Engineering and Technology; Jeanne Hawkins, Air Force/Joint Performance Management Office; Deborah Ward, Shuttle Processing; Cathy Gieseler, Chief Counsel; back row, Robert Preston, Spaceport Services; and Wayne Ranow, International Space Station/Payloads Processing. Not pictured are June Perez, Deputy Director's Office, and Wendy Johnson, Expendable Launch Vehicle and Payload Carriers Program.





Columbia, atop its carrier, rolls under protective cover at Palmdale, Calif.

# Two Shuttles f





# erried home



Columbia flies over Tallahassee on its way to Kennedy Space Center.



At far left, Columbia is prepared at Boeing's Palmdale, Calif., plant for its flight back to Kennedy Space Center. Above, Columbia arrives at KSC's Shuttle Landing Facility atop a Shuttle Carrier Aircraft after its trip from California and an overnight stay at Cape Canaveral Air Force Station. At right, Atlantis is demated from its carrier after arriving at the SLF. At left, Atlantis is towed into the Orbiter Processing Facility bay 3.



For the first time in the history of the Space Shuttle program, two Shuttles arrived via ferry flights at the Cape Canaveral Spaceport on the same day.

Several days of bad weather and flight cancellations created the need for Atlantis and Columbia atop their special 747 carrier aircraft to land within hours of each other on March 5.

Atlantis arrived aboard the Shuttle Carrier Aircraft at KSC's Shuttle Landing Facility at about 10:45 a.m.

Because of the time needed to process Atlantis at the SLF, Columbia landed about 2:35 p.m. on the Skid Strip at the Cape Canaveral Air Force Station, next door to KSC.

The skid strip landing was another first in Space Shuttle history.

After Atlantis was towed to the Orbiter Processing Facility bay 3, Columbia was ferried to the SLF on March 6, landing at 3:44 p.m.

The two space shuttles departed the Antelope Valley north of Los Angeles within less than an hour of each other on March 1.

Atlantis returned from mission STS-98 on Feb. 19, landing at NASA's Dryden Flight Research Center located at Edwards AFB.

Columbia left from Palmdale, Calif., and Atlantis departed Edwards Air Force Base, north of Palmdale. The two Space Shuttle ferry flights were independent of each other, and not within each other's visual range.

Columbia did a fly-by over Tallahassee on its way home. The fly-by over the downtown Capitol area, Florida A&M University and Florida State University drew an enthusiastic audience.

Columbia had been in Palmdale for extensive avionics upgrades including a new, highly advanced "glass cockpit" that replaces mechanical instruments with 11 full-color flat-panel displays. Its upgrades include more than 100 modifications made over the past 18 months.

Acting NASA Vehicle Manager Jeff Angermeier said the Columbia team is excited about getting the orbiter back after so long an absence.

"We're all looking forward to having the orbiter back in flow and getting it ready for the next flight to the Hubble Space Telescope," Angermeier said.

# Weather study looks at thick clouds

Few things are more frustrating – or costly – than a launch that is scrubbed or delayed due to weather. Weather violations are the greatest cause of launch delays and scrubs, and 30 percent of weather delays are related to lightning.

But that number might soon be changing. Weather researchers are hoping that a new study will help avoid costly launch scrubs and delays due to lightning.

The study, which began at Kennedy Space Center in June 2000 and is scheduled to conclude at the end of June 2001, may result in lightning avoidance rules that are less restrictive, yet at least as safe as current Launch Commit Criteria (LCC), the set of rules that governs all U.S. launches.

The study team is using a modified Cessna Citation II airplane provided by the University of North Dakota's Atmospheric Sciences Department.

The quick-moving, twin-jet aircraft is equipped with cloud physics instruments and can stay airborne for up to four hours. It has been all over the world and has a reputation for reliability and accuracy. The Citation aircraft will be used to investigate the electrical charges and fields associated with triggered lightning.



A modified Cessna Citation II airplane is prepared for use in a NASA weather study at Kennedy Space Center.

In 1987, lightning struck an Atlas-Centaur rocket during its ascent, resulting in the vehicle being destroyed. Since that time several rules have been established to avoid a recurrence of that event.

"That lightning was triggered by the rocket itself; there were no local lightning strikes at that time," said Dr. Frank Merceret, chief of KSC's Applied Meteorology Unit and program manager for the study. "Triggered lightning is harder to detect and predict. You can't see electrical charges or fields in the clouds the way you can see natural lightning. The potential for triggered lightning may be present,

but with current radar, there is no way to determine if those electrical charges are, in fact, present."

By comparing data gathered by the aircraft to information provided by ground tracking radars located in Melbourne and at Patrick Air Force Base and KSC, the research team hopes to discover reliable patterns. If patterns can be established, forecasters can get a better idea of the electrical fields and charges present in clouds near the launch site.

The study began in June 2000, during the peak of Central Florida's thunderstorm season, when the team spent 42 hours gathering data

relating to anvil clouds. Anvil clouds are high clouds that are blown off the tops of thunderstorms. LCC declare the cloud safe only if it is detached from its thunderstorm for three hours or more. The research team hopes the study will show that the three-hour time limit can be shortened without jeopardizing safety.

In February, the team returned to KSC to study the layered overcast of thick clouds. A cloud research radar was brought to KSC by the National Oceanic and Atmospheric Administration for the study.

Currently, if clouds are 4,500 feet thick or more and any part is between -4 and 32°F, the vehicle is not permitted to fly. However, researchers theorize that the thickness of the cloud may have little to do with safety, and that the rules associated with thick clouds can be improved.

The research team will study anvil clouds once more in June 2001, although they will also study thick clouds if any are available. At the end of that month, they will begin their analysis.

If Mother Nature cooperates for the study in June, the team hopes to have gathered enough conclusive data to recommend changes to some or all of the rules that pertain to lightning.

# Group focuses on range technology

How will the space program keep up with a ever-changing world of advancing technologies? In the future, will ground systems be capable of supporting Reusable Launch Vehicles and Expendable Launch Vehicles?

A new working group has come together to answer these questions, and to devise a plan for preparing all U.S. launch bases and ranges for future technologies.

The Advanced Range Technology Working Group (ARTWG) met for the first time March 1 at Kennedy Space Center for a kick-off conference attended by more than 100 invitees and addressed by KSC Director Roy Bridges.

ARTWG was formed in response to a specific recommendation resulting from the study, "The Future Management and Uses of the U.S. Space Launch Bases and Ranges." The White House-sponsored study was performed by a working group co-chaired by the Office of Science and

Technology Policy and the National Security Council.

The subsequent report recommended "the Air Force and NASA should develop a plan to examine, explore, and proceed with next-generation range technology development and demonstration, with a focused charter to improve safety, increase flexibility and capacity, and lower costs for reusable and expendable launch vehicles."

From this recommendation, ARTWG was established to identify, develop, and demonstrate range technologies.

The working group will be co-chaired by NASA and the Air Force, but will be soliciting input from other federal agencies, state agencies, spaceports, industry and academia.

ARTWG's work and discoveries will ensure ground systems are prepared for the launch vehicles of the future.



Center Director Roy Bridges addresses the Advanced Range Technology Working Group who met at Kennedy Space Center on March 1.



# FIRST teams compete at KSC-VC

What do you get when you combine math, science, metal, intense players, screaming fans, and an occasional head of electric blue hair?

You've got the invasion of the tenth annual FIRST Robotics competition, held at the Kennedy Space Center Visitor Complex March 1-3.

For Inspiration and Recognition of Science and Technology (FIRST) is a national robotics competition that challenges high school students by giving them the opportunity to gain first-hand engineering experience outside of the classroom. FIRST teams are paired with professional engineers for six weeks to design and build their competition robot.

Amy Simpson, a student at Astronaut High School, said that she had a great time working with the professional engineers and learned so much. "Most of the time, they had more fun than us. They never tell us what to do, they ask us what we think we should do," she said.

Eduardo Lopez del Castillo is a NASA engineer who works with a FIRST Team. "NASA/KSC and FIRST put our future leaders first. We exposed them to the real problems they will have to solve in the future," he said. "There are many good programs like this at KSC. I encourage our workforce to engage in these programs and make them a way of life much like we engage in training our kids to do



sports."

NASA was the top sponsor of this year's competition season, sponsoring multiple teams nationwide. NASA/KSC and its contractors can especially be proud of their nine local teams, two of which were semifinalists. The Space Coast Team No. 233, with students from Rockledge and Cocoa Beach high schools, placed second in qualifying matches.

In the final tournament, Team No. 21, ComBBAT, with students from Astronaut and Titusville High School, was a member of the alliance that placed second overall.

The winning alliance was Team



Above, FIRST student teams and spectators look over the playing field and listen to instructions about the competition. At left, the ComBBAT 2001 team gives a final check to their robot. ComBBAT is a KSC joint-sponsored team of students from Astronaut and Titusville high schools,

No. 343 Metal-In-Motion, South Carolina; Team No. 312 Heat Wave, Lakewood & Osceola high schools; Team No. 538 Dragon Slayers, Alabama; Team No. 57 Leopards,

Texas; and Team No. 459 Rampage Phantasm, Gainesville.

For a piece of the action, log onto <http://science.ksc.nasa.gov/robotics>.

## VISION ...

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One of the goals outlined in the "ISS Vision" is to enhance the quality of workforce experience and NASA/Boeing relations.

Tommy Holloway, the ISS program manager from Johnson Space Center, said, "People will remember the ISS program as one program that helped lead the way to accomplish world peace."

The "ISS Vision" presentation acknowledged that KSC employees are working toward making this vision become a reality everyday.

Brewster Shaw, the vice president and general manager of Boeing Houston, is eager about the joint venture between Boeing and NASA at KSC to assemble, integrate, test and launch the ISS.

"Together we can and we will make ISS the true success that it deserves to be," said Shaw. "Thank you for your part."

KSC management team members signed onto the "ISS Vision" banner to show their full commitment to this program.

Shaw and Holloway were joined on stage for the signing by Bruce Melnick, Jim Schofield, David Bethay, and Tip Talone from KSC.



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## Spaceport News

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